

# SECTION 1

## WHERE'S THE WATER?

*Outcome: What Students will learn*

- Water is a basic necessity of life.
- Where water is found throughout the Earth.
- How people around the world get drinking water.

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# CORE CONTENT STANDARDS

## Science

- SC-E-2.1.1 Earth materials include solid rocks and soils, water, and the gases of the atmosphere. Minerals that make up rocks have properties of color, texture, and hardness. Soils have properties of color, texture, the capacity to retain water, and the ability to support plant growth. Water on Earth and in the atmosphere can be a solid, liquid or gas.
- SC-E-2.1.2 Earth materials provide many of the resources humans use. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or growing the plants we use as food.
- SC-E-3.1.2 Organisms have basic needs. For example, animals need air, water and food; plants need air, water, nutrients, and light. Organisms can survive only in environments in which their needs are met.
- SC-E-3.3.3 All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial.
- SC-M-2.1.5 Water, which covers a majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle. Water dissolves minerals and gases and carries them to the ocean.

## Social Studies

- SS-E.3.1.1 Scarcity requires people to make choices about using goods, services and limited resources.
- SS-E-4.1.1 Simple physical, political and thematic maps, globes, charts, photographs, aerial photographs, and graphs are used to find and explain locations and display information.
- SS-E-4.2.1 Every place is unique and is described by its human and physical characteristics.
- SS-E-4.3.2 Humans usually settle where there are adequate resources to meet their needs.
- SS-E-4.4.1 People depend upon the physical environment for food, shelter and clothing.
- SS-E-4.4.2 People adapt to or modify the environment to meet their needs.
- SS-E-4.4.3 The physical environment both promotes and limits human activities.
- SS-M-4.4.1 Technology assists human modification of the physical environment.
- SS-M-4.4.4 Individual perspectives impact the use of natural resources.

## Math

- MA-E-1.1.2 The operations of addition, subtraction, multiplication and division.
- MA-E-3.1.3 The process of using data to answer questions.
- MA-E-3.2.1 Pose questions that are answered by collecting data.
- MA-E-3.2.5 Make predictions and draw conclusions based on data.

# WHERE'S THE WATER?



## It's all about Quality

What's the most important thing that determines your quality of life and your ability to survive? It's water! Water keeps you alive. (A person can live only a week with no water, but a month without food.) Water regulates your body temperature, delivers the nutrients to your body, and keeps your skin smooth. You need about  $\frac{2}{3}$  of a gallon of water every day to stay healthy. Your family will use about 6,000 gallons of water every month at home for cooking, cleaning, bathing, etc. Water helps produce the food you eat, the car you drive, the house you live in and the clothes you wear.

Water is the most common substance in the world. Water covers 75% of the Earth; but most of that water is not drinkable.

**97%** of the Earth's water is salt water. Salt water is filled with salt and other minerals. Humans cannot drink this water. It's too difficult and expensive to remove the salt.



**2%** of the Earth's water is ice, frozen in glaciers at the North and South Poles. This water could be used for drinking water if we could melt it down and get to it!

**1%** of the Earth's water is fresh water that we can use. (Fresh water must be purified for drinking water.)

So all the people in the world must use the same 1% of available fresh water. But often water is not where it's most needed or the quality is poor. In the United States, most people take safe drinking water for granted – you turn on the faucet and it's there. But in many parts of the world safe drinking water is something sacred.

Nearly 1.1 billion people don't have access to safe drinking water. What does that mean? It means children get sick and die every day because they drink **contaminated** water. Grown-ups and children have to walk for miles every day to find safe drinking water. Why isn't it safe? Many underdeveloped countries don't have water utilities to provide clean water. Those countries often don't have **sanitation** services, which means sewage gets mixed with the water. (More on the problem can be found in Section 11.)

## NOTE:

Sections 1 and 2 complement each other. Section 1 deals with a global understanding of water. Section 2 focuses on how students and their families use water every day.

## Water in the United States

In the United States, most people have good safe drinking water. People in our country get their water from either a **surface supply** (river, lake or reservoir) or **ground water** (a well or an aquifer). There are still problems though in some parts of the country where the water supply is not good enough to meet the demand.

In Louisville, we take our water from the Ohio River, a surface supply. We're lucky, because we have an endless supply of water. Nearly 50 billion gallons of water flow by Louisville every day. On average, the Louisville Water Company takes out only 127 million gallons daily.



But in some parts of the United States, water is not as plentiful. Think about a **desert** where there's less than 10 inches of rain a year. How would someone living in Yucca Valley, California get water? Yucca Valley has no source water available. In California, the state has spent millions of dollars building 600 miles of pipeline that takes water from areas where there's plenty of water, like in northern California to areas where water is scarce, like in Yucca Valley. Yucca Valley has also drilled far into the ground to find water.

Most people in the United States get their drinking water from the ground. Water is underneath the Earth's surface almost everywhere – in the mountains and even in the deserts. Much of that water is stored in **aquifers**. An aquifer is a huge formation of rock, sand or gravel that holds water. They're found all over the world. One of the largest aquifers in the United States is the Ogallala Aquifer stretching from Texas to Canada. This rock formation can hold up to 650 trillion gallons of water. Water utilities drill wells into the aquifer and draw the water out.



# WATER WORDS

**Aquifer:** an underground layer of rock, gravel, sand or soil that holds water.

**Contaminated:** something that is not pure; unsafe.

**Desert:** a land area that receives less than 10 inches of rain a year.

**Gallon:** a unit of measurement.

**Ground water:** water that's stored in the ground, usually in a well or an aquifer.

**Sanitation:** means of dealing with sewage or waste.

**Surface water:** water that's found in a lake, river or reservoir.

**Tap water:** water that comes from the faucet.



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# Activity #1: Map it Out!

## Objective:

Students will learn where water is located in the world and the small percentage that's available for drinking water.

**Time:** 30 minutes

## You'll need:

- Gallon jug
- Tablespoon
- Globe
- Copies of "Water Sources in North America"
- U.S. map

## Here's what to do...

Use a globe as an illustration for this activity.

1. Pose the question: "If astronauts looked at Earth from space, what would they see...green or blue?" They'd see mostly blue, because most of the Earth is water.
2. Explain the types of water found throughout the Earth. Have them use the globe as an illustration.
3. Have students locate on the globe where they'd find salt water, glaciers and fresh water.
4. Ask students what type of water (salt water, fresh water or glaciers) makes up the greatest percentage of the Earth's water supply. Then go over the statistics from page 2.
5. Illustrate the amount of fresh water available by using a gallon jug. Fill the gallon jug with water. Then pour out a tablespoon. The water in the gallon jug represents all the water on Earth. The tablespoon represents the world's fresh water – water that's available for drinking water.
6. Have students look at a map of the United States. Find Kentucky and Louisville. Find the river that would supply drinking water to Louisville. What other cities get their drinking water from that river? (*It's the Ohio River. Evansville, Cincinnati, Florence and Pittsburgh all get their water from the Ohio River.*)
7. Give each student a copy of "Water Sources in North America." Have students complete the worksheet. What parts of the United States do not have lots of water available?



# WORKSHEET

## Water Sources in North America

People get their drinking water from either surface water (lakes and rivers) or ground water (water that's stored in the ground). In some places, pipelines carry water for hundreds of miles to extremely dry locations.



1. This is a map of \_\_\_\_\_
2. Name two cities that use surface water. \_\_\_\_\_
3. Name a city that uses ground water. \_\_\_\_\_
4. Which city uses mountain snow for water? \_\_\_\_\_
5. Which city is in a desert and would need help getting water? \_\_\_\_\_
6. Where does Louisville get its drinking water? \_\_\_\_\_

# WORKSHEET ANSWERS

## Water Sources in North America

People get their drinking water from either surface water (lakes and rivers) or ground water (water that's stored in the ground). In some places, pipelines carry water for hundreds of miles to extremely dry locations.



1. This is a map of United States, Canada and Mexico
2. Name two cities that use surface water. Louisville, Washington D.C., Pittsburgh, Chicago and Montreal
3. Name a city that uses ground water. Lincoln and Mexico City
4. Which city uses mountain snow for water? Denver
5. Which city is in a desert and would need help getting water? Yucca Valley
6. Where does Louisville get its drinking water? Ohio River



# Activity #1: Map it Out!

## A follow-up

**These are great “think” questions! Try these as a class discussion or a writing assignment.**

### **Why can't we use salt water for drinking water?**

*The process to remove salt from drinking water is very time consuming and very costly. The cost prohibits water utilities from changing salt water to drinking water.*

### **Why can't we use glaciers for drinking water?**

*Glaciers are frozen ice – sometimes hundreds of feet in depth. Plus, most are in remote areas!*

### **With only 1% of the water in the world available for drinking water, is there enough water for everyone?**

*Not really – especially during a drought. That's why many communities have water restrictions and water conservation programs in place.*

### **Where do most people get their drinking water - from the surface or from the ground?**

*In the United States, it's from the ground. About 47% of Americans get their drinking water from surface water, 53% from ground water. Think about the layout of our country. Big cities are often situated by rivers or lakes. Rural communities must often depend on ground water.*



The header features a dark grey background with various white geometric shapes like squares, triangles, and circles. A large, stylized white footprint is visible on the right side. The title 'Activity #2: What a Load to Carry!' is written in a large, bold, black font, curving across the top of the page.

# Activity #2: What a Load to Carry!

## Objective:

Students will learn the benefits of having indoor plumbing and safe drinking water. This provides a real-life model for how much water a family uses and how much effort it takes to transport water.

**Time:** One class period for instruction. One hour for the experiment.

## You'll need:

- A classroom, playground or parking lot with a water source
- Two large trash cans
- Empty gallon milk jugs or gallon buckets (as many as possible)
- A watch or clock with a second hand

## Here's what to do...

1. Explain to students the importance of water to sustain life. Explain how most people in the world do not have access to safe drinking water and must walk miles every day to get it. Remind the students they need almost a gallon of water ( $\frac{2}{3}$  of a gallon) every day to drink for good health. Their family will use as much as 150 gallons every day at home for cooking, cleaning, bathing, etc.
2. Divide the students into groups of 4. Each group represents a family.
3. Describe the family situation: The family lives in Africa. They have no indoor plumbing and the river next to their home is contaminated with sewage, because they have no sanitation department. The family can only get water by walking one mile to a spring – a natural pool of water that's safe to drink. The family gets their buckets and jugs and decides to form a "Water Troop." The family's job is to carry enough water to their house to make sure, first, that everyone stays alive. Then, try to carry enough water for cooking, cleaning, bathing, etc. Each bucket or jug represents one gallon of water.
4. In the ideal situation the family needs:
  - 4 gallons every day for good health
  - 28 gallons a day to do the dishes
  - 15 gallons for cooking
  - 56 gallons for bathing and washing clothes
  - 10 gallons to water the garden

# Activity #2: What a Load to Carry!

## How to do the experiment:

1. Place the two trash cans a good distance apart. This represents the mile students will walk to find the water. It's a mile to the spring and a mile back to the house.
  2. Fill one of the trash cans with water. This will represent the spring. Maybe place a sign and give the spring a name!
  3. Leave the other trash can empty. This represents the family's house. You might place a sign here too.
  4. Select one family to start. Give each member of the family two buckets or jugs. Remind students to count how many buckets of water they carry home.
  5. Time them as they walk from their house (the empty trash can) to the spring. Students should fill up their buckets/jugs and carry them back to their house, dumping the water into the empty trash can.
  6. Stop the group at 5 minutes. How many gallons of water did they carry? Has each member of the family brought enough water home to keep them alive? (*Each person needs almost a gallon of water to stay alive.*)
  7. Has the group carried enough water to cook for the day? (*They need 15 gallons of water for this.*)
  8. A gallon of water weighs 8.3 pounds. How much weight has each person carried?
  9. How many miles did each member of the family walk to get the water?
- You can use the accompanying worksheet on page 1-12 to help the students figure the answers.***
10. Let another family try the experiment. (Make sure to put all the water back into the "spring" trash can.)
  11. This time, the children are sick and they can't walk to get the water. So it's just the adults making the journey.
  12. Let two people carry as many empty buckets/jugs as they can and walk to the spring, fill them up and then back to the house. Just like before, students should fill up their buckets and empty them at the "house" trashcan."
  13. Stop the group at 5 minutes. How much water did they carry? How do their results compare with the first group?

## Think about it!

Get the students to talk about what their life would be like if they had to walk for water every day and about the convenience of having indoor plumbing – faucets, toilets and tubs in their home.

# Activity #2: What a Load to Carry!

Your family lives in an African community where there's a shortage of clean drinking water. Your home has no indoor plumbing and the river next to your home is contaminated with sewage because there's no sanitation department. Your family can only get water by walking one mile to a spring – a natural pool of water that's safe to drink.

The family's job is to carry enough water to the house to make sure first that everyone stays healthy. Then, try to carry enough water for cooking, cleaning, bathing, etc.



**Every day the family needs:**  
**1 gallon** for each person to stay healthy

**28 gallons** to do the dishes

**15 gallons** for cooking

**56 gallons** for bathing/  
washing clothes

**10 gallons** to water the garden



# Activity #2: What a Load to Carry!

## Four members of the family get the water



### SITUATION #1

1. How many gallon buckets/jugs of water did the family carry in five minutes? \_\_\_\_\_
2. Did the family carry enough water for everyone to stay healthy? \_\_\_\_\_
3. Did the family carry enough water to cook for the day? \_\_\_\_\_
4. In an ideal situation, a family needs about 113 gallons of water every day. How many more trips to the spring would it take to meet the need? \_\_\_\_\_
5. How much time would that take? \_\_\_\_\_
6. A gallon of water weighs 8.3 pounds. Calculate how much weight the family carried in five minutes? \_\_\_\_ gallons x 8.3 = \_\_\_\_\_

## Adults get the water

### SITUATION #2

1. How many gallon buckets/jugs of water did only two people carry in five minutes? \_\_\_\_\_
2. Is it more or less than what four people carried?  
\_\_\_\_\_
3. Did mom and dad carry enough water for everyone to stay healthy? \_\_\_\_\_
4. Did mom and dad carry enough water to cook for the day? \_\_\_\_\_
5. How many more trips to the spring would mom and dad need to make to get the 113 gallons of water the family needs for the day? \_\_\_\_\_
6. How much time would that take? \_\_\_\_\_



# Quiz: Test Your H2O IQ!



1. What's the most common substance in the world?  
\_\_\_\_\_
2. Water covers 75% of the Earth. List three places where you find water. \_\_\_\_\_  
\_\_\_\_\_
3. How much water on the Earth is available for drinking water? \_\_\_\_\_
4. Everyone in the world has access to safe drinking water. True or False
5. In the United States people get their drinking water from two sources. a. \_\_\_\_\_ b. \_\_\_\_\_
6. Where does Louisville get its drinking water?  
\_\_\_\_\_
7. Name a place in the United States where there's not a big supply of water. \_\_\_\_\_

Match the water words to their definition!

Aquifer	water that's stored in the ground, usually in a well or an aquifer
Desert	an underground layer of rock, gravel, sand or soil that holds water
Surface water	a land area that receives less than 10 inches of rain a year
Ground water	water that's found in a lake, river or reservoir

You use water every day!  
List 10 ways you can use water.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

# Quiz: Test Your H2O IQ! Answers



1. What's the most common substance in the world?

water

2. Water covers 75% of the Earth. List three places where you find water.

oceans

rivers

north/south pole

3. How much water on the Earth is available for drinking water?

1%

4. Everyone in the world has access to safe drinking water. True or False

5. In the United States people get their drinking water from two sources. a. ground water b. surface water

6. Where does Louisville get its drinking water?

Ohio River

7. Name a place in the United States where there's not a big supply of water. desert

Match the water words to their definition!

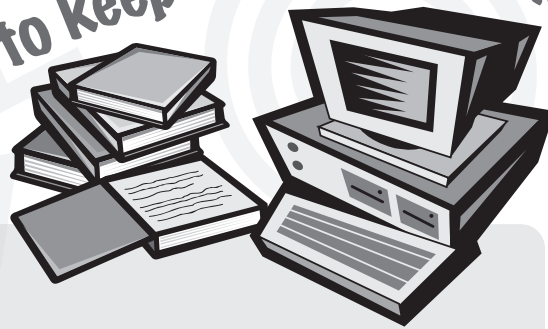
Aquifer	water that's stored in the ground, usually in a well or an aquifer
Desert	an underground layer of rock, gravel, sand or soil that holds water
Surface water	a land area that receives less than 10 inches of rain a year
Ground water	water that's found in a lake, river or reservoir

You use water every day!  
List 10 ways you can use water.

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



Check out these opportunities to keep the learning flowing!



### Books:

- Chief Seattle (1991). *Brother eagle, sister sky*. New York, NY: Deal Books.
- Emil, J. (1984). *All about rivers*. New York, NY: Troll Associates.
- Hoffman, M., Ray, J. (1994). *Earth, fire, water, air*. New York, NY: Penguin Books.
- Hopper, M., Doady, C. (1998). *The drop in my drink*. New York, NY: Penguin Books.
- Locker, T. (1987). *Where the river begins*. New York, NY: Dial Bookers.
- Peters, L. (1987). *Good morning, river*. New York, NY: Arcade Publishing.
- Seixas, J. (1987). *Water, what it is and what it does*. New York, NY: Green Willow Books.

### Web sites:

- [www.epa.gov/kids/](http://www.epa.gov/kids/) EPA's Explorer Club for kids. Loaded with information, projects and games.
- [www.epa.gov/owow](http://www.epa.gov/owow) Teacher information and activities.
- <http://library.thinkquest.org/28022> Children helped create this experiment "All Along a River."
- [www.waterforpeople.org](http://www.waterforpeople.org) Site devoted to the lack of safe drinking water in underdeveloped countries.
- [www.projectwet.org](http://www.projectwet.org) Good activities for students; good resource for teachers.

### Louisville Water Company Opportunities:

- [www.tappersfunzone.com](http://www.tappersfunzone.com) Click on "Teacher Tools" for an interactive quiz.

Extra, Extra!!!